

## **REMARKS**

### **Interview**

Applicants wish to thank Examiner Beisner for the courtesies extended to Applicants and Applicant's counsel in the interview on October 11, 2007, during which proposed claim amendments to overcome the outstanding rejections were discussed.

### **Claim Rejections – 35 USC § 102**

#### **A. Claims 1, 2 and 4-15 have been rejected under 35 U.S.C. 102(b) as being anticipated by Lipshutz et al. (US. 5,856,174)**

The Examiner has rejected claims 1, 2 and 4-15 under 35 U.S.C. 102(b) as being anticipated by Lipshutz et al. (US. 5,856,174; "Lipshutz" hereinafter) on the grounds that Lipshutz showed "a microfluidic structure (See Figure 2B) comprising: a first surface (116) including a pneumatic channel (126); a second surface (106) including a fluidic channel (110, 108); and an elastomeric membrane (114) located between the first and second surfaces such that application of a pressure or a vacuum to the pneumatic channel causes the membrane to deflect to modulate a flow of a fluid in the fluidic channel." Applicants respectfully traverse.

Claim 1 presently recites a microfluidic structure comprising:

a plurality of diaphragm valves that control fluid flow along each of a plurality of fluidic channels, said fluidic channels each comprising a discontinuity and wherein the microfluidic structure comprises an elastomer membrane sandwiched between a pneumatic layer and a fluidic layer, wherein:

the pneumatic layer comprises a first surface including at least one pneumatic channel facing the membrane and valve areas aligned with said fluidic channel discontinuities; the fluidic layer comprises a second surface including the plurality of fluidic channels facing the membrane;

the elastomeric membrane normally prevents fluid flow across the fluidic channel discontinuities; and

the application of a vacuum to the at least one pneumatic channel causes the membrane to deflect allow a flow of a fluid across the fluidic channel discontinuities, thereby forming the plurality of diaphragm valves.

Lipshutz does not teach or disclose a structure including a pneumatic layer wherein "the pneumatic layer comprises a first surface including at least one pneumatic channel facing the

membrane” as recited in present claim 1. Lipshutz further does not teach or disclose a structure wherein “the application of a vacuum to the at least one pneumatic channel causes the membrane to deflect to allow a flow of a fluid across the fluidic channels” as recited in present claim 1.

The Examiner pointed to Figure 2B of Lipshutz. However, a closer examination shows that Figure 2B does not show i) a pneumatic layer wherein the pneumatic layer comprises a first surface including at least one pneumatic channel facing the membrane or ii) a device wherein the application of a vacuum to at least one pneumatic channel causes the membrane to deflect to allow a flow of a fluid across fluidic channels.

First, rather than a pneumatic layer including at least one pneumatic channel facing the membrane, Lipshutz instead shows an “additional planar member 116 having an opening 126 for application of a vacuum pressure for deflection of diaphragm 114” (see column 17, lines 13-16). In the illustration of Figure 2B “opening 126” is shown as an opening (i.e., a port or via) within additional planar member 116, positioned across from diaphragm valve 114. Furthermore there is no teaching or suggestion that opening 112 in planar member 116 faces the diaphragm valve 114.

In contrast, the specification clearly teaches that the term “pneumatic channel” as recited in claim 1 means an elongate groove or trench formed in a substrate (e.g., by etching) and facing a membrane. The term is not used in the specification to refer to an opening (i.e., a port or via) that connects opposite faces of pneumatic or fluidic layer. For example, the specification teaches that “etched channels in the pneumatic wafer distribute the actuation vacuum to valve region 109” while “[m]echanisms for supplying pressure or vacuum to etched channels associated with a pneumatic wafer are herein referred to as ports or pneumatic ports” (see page 9, lines 27-30; Figure 1A). Additionally, the specification clearly supports a pneumatic channel facing the membrane as recited in claim 1. For example, the specification teaches that “etched channel features can directly contact the membrane and form a hybrid glass/elastomer channel as shown in Figure 1B” (see page 8, line 32 to page 9, line 2 and Figure 1B).

Lipshutz, then, only teaches a planar member having openings (i.e., ports) and not channels or channels combined with ports for applying a vacuum for deflection of a diaphragm (i.e., a valve). Furthermore, the openings that are taught are across from a diaphragm valve and do not face a membrane. Therefore, the reference fails to teach a pneumatic layer comprising a first surface including at least one pneumatic channel facing the membrane, as presently claimed.

Second, rather than teaching deflecting a membrane to allow a flow of a fluid across fluidic channels, Lipshutz instead teaches “deflection of the diaphragm results in a gap between

the first and second planar members, thereby creating a fluid connection between the reaction chamber 104 and the fluid channel 110, via the inlet 108” (column 16, lines 61-65; Figure 2B). Thus, rather than allowing a flow of fluid across fluidic channels, deflection of the diaphragm of Lipshutz modulates a fluid connection between a fluid channel and an inlet connected to a chamber. Inlet 108 as illustrated in Figure 2B of the reference is shown as an opening or via rather than a channel and there is no teaching or suggestion in the reference that inlet 108 is a channel. Since the phrase “flow of a fluid across fluidic channels” as recited in claim 1 can clearly be interpreted from the specification as distinguishable from a fluid connection between a fluid channel and an inlet to a chamber as taught by Lipshutz, it follows that the reference fails to teach a device wherein the application of a vacuum to at least one pneumatic channel causes the membrane to deflect to allow a flow of a fluid across fluidic channels, as presently claimed.

Accordingly, Lipshutz did not anticipate because it did not teach each and every element of the invention present in claim 1. Claims 2-9, 11-14 and 45-49 depend from claim 1 and therefore include every element of claim 1. It follows that the reference fails to teach each and every limitation of claims 2-9, 11-14 and 45-49 and they are also not anticipated.

In sum, Applicant’s respectfully request withdrawal of the rejection.

**B. Claims 1, 2, 4-6 and 15 have been rejected under 35 U.S.C. 102(b) as being anticipated by Moles (US. 6,073,482)**

In addition the Examiner has rejected claims 1, 2, 4-6 and 15 under 35 U.S.C. 102(b) as being anticipated by Moles (US. 6,073,482; “Moles” hereinafter) on the grounds that Moles showed “a microfluidic structure (See Figure 1B) comprising: a first surface (10) including a pneumatic channel (12); a second surface (6) including a fluidic channel (14); and an elastomer membrane (22) located between the first and second surfaces such that the application of a pressure or vacuum to the pneumatic channel causes the membrane to deflect to modulate a flow of fluid in the fluidic channel.” Applicants respectfully traverse.

As discussed above, claim 1 recites in part that “the pneumatic layer comprises a first surface including at least one pneumatic channel facing the membrane.”

The Examiner pointed to Figure 1B of Moles. However, a closer examination of Figure 1B shows that item 12 is not a pneumatic channel at all, but rather is a “vaulted concavity”. (See Moles, col. 4, line 26.) The vaulted concavity is connected to a vacuum source through “a valve actuation conduit 30” which is “provided so that pneumatic or hydraulic fluid in communication with the conduit will selectively apply negative or positive pressure to the conduit thereby

opening and closing the valve 22” (see column 4, lines 29-33; Figure 1B). Thus, the valve actuation conduit also is not a channel as that term is used in the claims, but is more akin to a “via”. Accordingly, Moles does not show a fluidic channel at all and certainly does not show one that faces the membrane, as the present claims require.

Accordingly, Moles did not anticipate because it did not teach each and every element of the invention present in claim 1. Claims 2, 4-6, 15 and 45-49 depend from claim 1 and therefore include every element of claim 1. It follows that the reference fails to teach each and every limitation of claims 2, 4-6, 15 and 45-49 and they are also not anticipated.

In sum, Applicant’s respectfully request withdrawal of the rejection.

**C. Claims 1-15 have been rejected under 35 U.S.C. 102(a) as being anticipated by Grover et al. (Micro Total Analysis Systems 2002)**

Further the Examiner has rejected claims 1-15 under 35 U.S.C. 102(a) as being anticipated by Grover et al. (Micro Total Analysis Systems 2002; “Grover” hereinafter). Applicants respectfully traverse.

Pursuant to 35 U.S.C. 102:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Since claim 15 is canceled, the rejection in respect to claim 15 is moot.

The co-inventors of the instant application are Richard A. Mathies, William H. Grover, Brian Paegel, Alison Skelley, Eric Lagally, Chung N. Liu, and Robert Blazej. The Grover reference was authored by William H. Grover, Alison M. Skelley, Chung N. Liu, Eric Lagally and Richard A. Mathies.

Two of the originally named co-inventors, Brian Paegel and Robert Blazej, are no longer inventors on the pending claims (pending claims presently include claims 1-9, 11-14 and new claims 45-49) in view of Applicants’ election of claims 1-15 with traverse in response to the restriction requirement dated March 7, 2007. Accordingly in compliance with 37 CFR 1.48(b) a

request and processing fee for amendment of inventorship deleting Brian Paegel and Robert Blazej, is submitted herewith.

Since the Grover et al. reference is the work of five co-inventors of the instant application, it cannot be used as a basis to demonstrate the invention was “known by others” before the invention thereof by Applicants. Accordingly the reference is not anticipatory under 35 U.S.C. 102(a) and withdrawal of the rejection is respectfully requested.

### **Claim Rejections – 35 USC § 103**

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP 2142, citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The Examiner has rejected claim 3 under 35 U.S.C. 103(a) as being unpatentable over Lipshutz et al. (US. 5,856,174). Applicants respectfully traverse.

Lipshutz does not meet the criteria for a *prima facie* case of obviousness since the reference does not teach or suggest each and every limitation of the claimed inventions.

Claim 3 includes the elements of claim 1 which, as discussed above, recites that “the pneumatic layer comprises a first surface including at least one pneumatic channel facing the membrane” and “the application of a vacuum to the at least one pneumatic channel causes the membrane to deflect to allow a flow of a fluid across the fluidic channels.” As discussed above, Lipshutz fails to teach a pneumatic layer wherein the pneumatic layer comprises a first surface including at least one pneumatic channel facing the membrane as presently claimed. Furthermore, the reference fails to teach a structure wherein the application of a vacuum to at least one pneumatic channel causes the membrane to deflect to allow a flow of a fluid across fluidic channels, as presently claimed.

Moreover, Lipshutz provides no motivation or suggestion for the recited features as claimed in the present inventions.

As a *prima facie* case of obviousness has not been met for claim 3 withdrawal of the rejection is respectfully requested. As absence of even a single criterion negates a *prima facie* case, Applicants respectfully request that the present rejection be withdrawn.

**Conclusion**

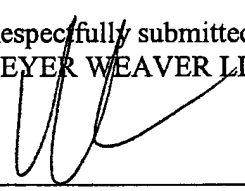
In view of the foregoing, it is respectfully submitted that all the claims are now in condition for allowance. Accordingly, allowance of the claims at the earliest possible date is requested.

If prosecution of this application can be assisted by telephone, the Examiner is requested to call Applicants' undersigned attorney at (510) 663-1100.

If any fees are due in connection with the filing of this amendment (including any fees due for an extension of time), such fees may be charged to Deposit Account No. 500388 (Order No. UCALP020).

Dated: 1/10/08

Respectfully submitted,  
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